

Figure 12: Exp on Storage Requirement

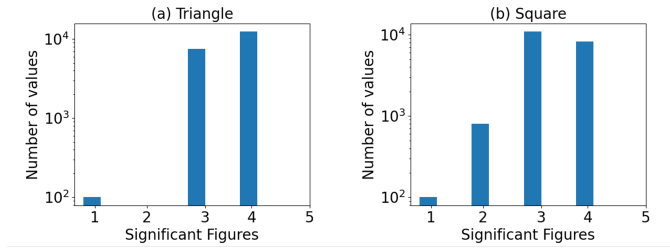


Figure 13: Exp on Threshold Determination

E SUPPLEMENTARY

E.1 Exp on Storage Requirement

Figure 12 shows that the impact of pre-calculation on storage requirements. It is evident that compared to other baselines, TSDB-STL adds 2x storage overhead, which is consistent with the complexity analysis.

E.2 Exp on Threshold Determination

We will present methods for determining the threshold parameters ϵ and ζ in sections 3.2 and 5. Specifically, we utilize the dataset's precision to establish these thresholds. ϵ governs the precision of L and D, which, as shown in Figure 2, undergo a squaring operation during usage. Consequently, epsilon is determined by the square root of the dataset's precision. In contrast, ζ determines the precision of the intermediate variable z, which involves only linear operations. Hence, zeta is set equal to the dataset's precision.

Figure 13 illustrates the distribution of significant figures across the dataset. We select the significant figures corresponding to the peak, which in this case represents the dataset's precision of $1e-4$. Therefore, ϵ is set to $1e-2$ and ζ is set to $1e-4$. As demonstrated by Figures 4 and 5, this threshold selection provides TSDB-STL with high performance and low time overhead, validating the effectiveness of our threshold determination method.

E.3 Exp on Varying Noise

Figure 14 compares the performance of TSDB-STL against others when dealing with noise. The figure shows that our method performs moderately well compared with baselines. Importantly, noise does not affect the efficiency of TSDB-STL, which remains the most efficient method throughout.

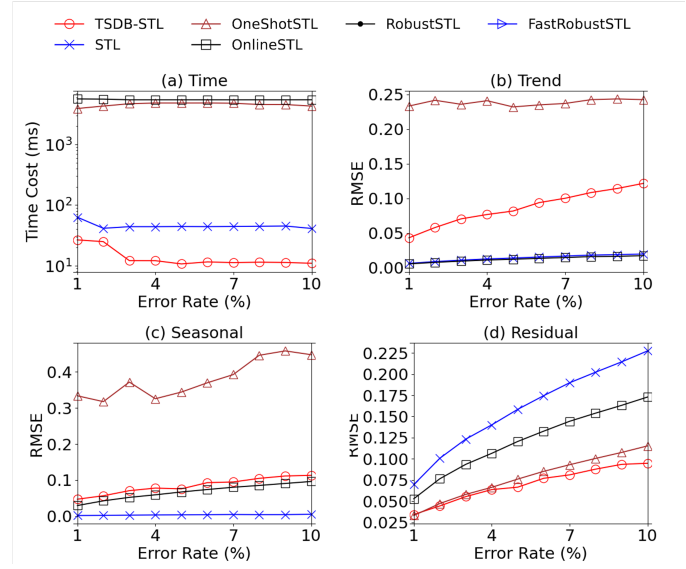


Figure 14: Exp on Varying Noise

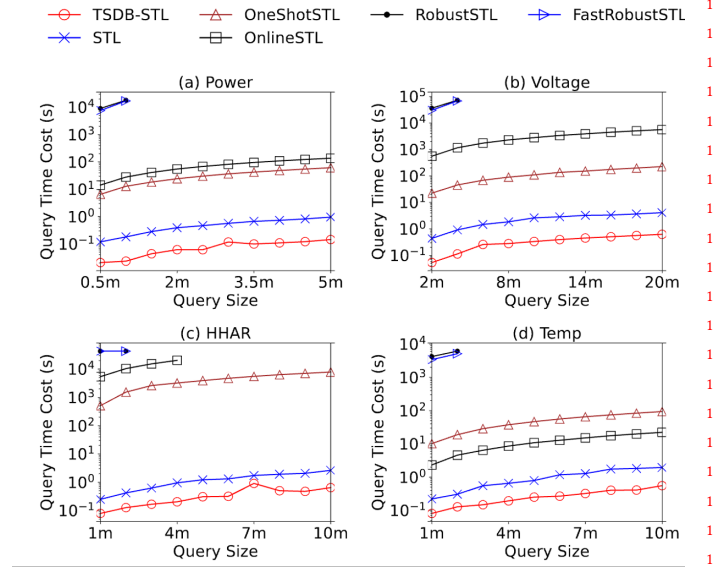


Figure 15: Exp on Query Size

E.4 Exp on Query Size

Figure 15 consistently demonstrate that our proposed TSDB-STL algorithm outperforms existing methods, thus validating that our approach's efficiency remains unaffected by the complexity of the data.

E.5 Case Study on Real-World Dataset

Figure 16 shows the time series inputs and decomposition result outputs for real-world data.

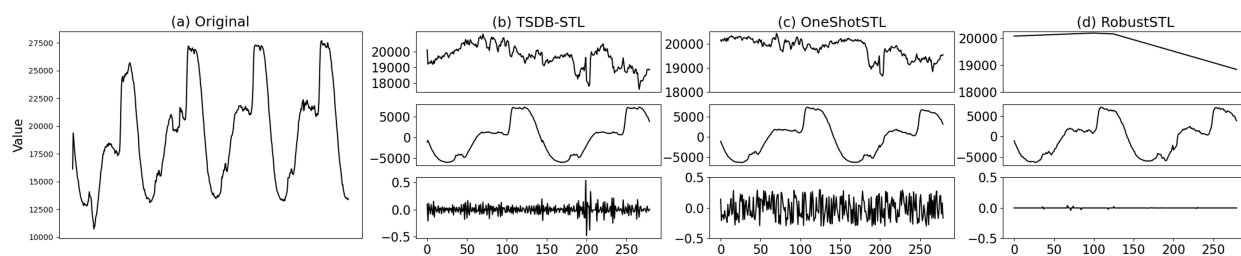


Figure 16: Case Study on Real-World Dataset